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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/542,732	07/20/2005	Yasuharu Ono	Q88728	2399

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SUGHRUE MION, PLLC
2100 PENNSYLVANIA AVENUE, N.W.
SUITE 800
WASHINGTON, DC 20037

EXAMINER	
SCHLIENTZ, NATHAN W	

ART UNIT	PAPER NUMBER
1616	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/542,732	ONO, YASUHARU	
	Examiner	**Art Unit**	
	Nathan W. Schlientz	1616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 12 January 2009.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1,4-6,9-11 and 14-19 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1,4-6,9-11 and 14-19 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12 January 2009 has been entered.

Status of Claims

Claims 1, 4-6, 9-11 and 14-19 are pending in this application and thus are examined herein on the merits for patentability. No claim is allowed at this time.

Withdrawn Rejections

Rejections and/or objections not reiterated from the previous Office Action are hereby withdrawn. The following rejections and/or objections are either reiterated or newly added. They constitute the complete set of rejections and/or objections presently being applied to the instant application.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in Graham v. John Deere Co., 383 U.S. 1,148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

1. Claims 1, 4-6, 9-11 and 14-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koji et al. (JP 07-304620) in view of Wells et al. (US 4,356,280).

Applicant claims:

Applicants claim an antimicrobial composition comprising a tetravalent metal phosphate-based antimicrobial particles represented by Formula (1), and inorganic compound particles wherein the size of both particles is substantially equal to or less than 10 μm, and the inorganic compound particles are smaller than the tetravalent metal phosphate-based antimicrobial particles.

Determination of the scope and content of the prior art

(MPEP 2141.01)

Koji et al. teach an antimicrobial resin composition obtained by mixing at least one metal oxide, such as zinc oxide and titanium oxide, and a phosphoric acid quadrivalent metal salt-based antimicrobial agent represented by the following formula $Ag_aA_bM_2(PO_4)_3 \cdot nH_2O$, wherein A is an alkali metal, an alkaline metal, ammonium or hydrogen, M is a quadrivalent metal, $0 \le n \ge 6$, with the proviso that (a)+(mb)=1 and m is valence of Al (Abstract). Koji et al. teach examples of the quadrivalent metal salt-based antimicrobial agent with the following formulas ([0015]).

$Ag_{0.005}Li_{0.995}Zr_2(PO_4)_3$
$Ag_{0.01}(NH_4)_{0.99}Zr_2(PO_4)_3$
$Ag_{0.05}Na_{0.95}Zr_2(PO_4)_3$
$Ag_{0.2}K_{0.8}Ti_2(PO_4)_3$
$Ag_{0.1}H_{0.9}Zr_2(PO_4)_3$
$Ag_{0.5}Na_{0.25}H_{0.25}Zr_2(PO_4)_3$
$Ag_{0.9}Na_{0.1}Zr_2(PO_4)_3$
$Ag_{0.7}Na_{0.3}Sn_2(PO_4)_3$

Koji et al. further teach that the titanium dioxide is preferably anatasu (i.e. anatase) or rutile with a particle diameter of 10 μm or less ([0010]), and that a calcium phosphate salt system antimicrobial agent had a particle diameter of 1.2 μm ([0037]). Koji et al. also teach that the antimicrobial resin may be used in resin for fiber ([0026]). Also, Koji et al. teach an example wherein 36 parts $Ag_{0.44}Na_{0.26}H_{0.30}Zr_2(PO_4)_3$ was mixed with 64 parts titanium dioxide ([0044]).

Ascertainment of the difference between the prior art and the claims

(MPEP 2141.02)

Koji et al. do not teach that the size of the anatase titanium dioxide is smaller than the size of the phosphoric acid quadrivalent metal salt-based antimicrobial agent. However, Wells et al. teach that titanium dioxide is a particularly preferred additive in spinning highly viscous synthetic polymer fibers used to decrease the luster of the resulting fiber spun from the molten polymer (col. 1, ll. 12-31). Wells et al. further teach that anatase titanium dioxide is the preferred form because it is softer than rutile, thereby giving lower abrasiveness in yarn processing equipment, and the preferred average diameter is 0.1 to 0.5 μm, most preferably 0.2 μm or less (col. 3, ll. 1-16).

Finding of *prima facie* obviousness

Rational and Motivation (MPEP 2142-43)

Therefore, it would have been *prima facie* obvious for one skilled in the art at the time of the invention to prepare an antimicrobial composition comprising anatase titanium oxide and a phosphoric acid quadrivalent metal salt-based antimicrobial agent represented by the formula $Ag_aA_bM_2(PO_4)_3 \cdot nH_2O$ with a particle size of 1.2 μm, as taught by Koji et al., wherein the particle size of the anatase titanium dioxide is preferably 0.2 μm or less, as reasonably taught by Wells et al. One of ordinary skill in the art would have been motivated to use anatase titanium dioxide with a particle size of 0.1 to 0.5 μm, most preferably 0.2 μm or less, because Wells et al. teach that anatase titanium dioxide with a particle size of 0.1 to 0.5 μm, most preferably 0.2 μm or less is preferably used in the production of fibers because it is softer than rutile, thereby giving lower abrasiveness in yarn processing equipment.

From the teachings of the references, it is apparent that one of ordinary skill in the art would have had a reasonable expectation of success in producing the claimed invention. Therefore, the invention as a whole would have been prima facie obvious to one of ordinary skill in the art at the time the invention was made, as evidenced by the references, especially in the absence of evidence to the contrary.

Response to Arguments

Applicants argue on pages 6-7 that the calcium phosphate salt system taught by Koji et al. do not correspond to the tetravalent metal phosphate system of the present invention, and Koji et al. do not teach or suggest anything about the average particle size of tetravalent metal phosphate-based antimicrobial particles. However, the examiner respectfully argues that the calcium phosphate salt system, as well as the zeolite system taught by Koji et al. are comparison references ([0037] and [0038]) wherein each of the samples, phosphoric acid zirconium salt system, calcium phosphate salt system and zeolite system, were individually admixed with iron oxide in a small grinder and then tested for color and antimicrobial properties. Therefore, one of ordinary skill in the art would formulate the tetravalent metal phosphate salt system (i.e., phosphoric acid zirconium salt system) having approximately the same particle size as the comparison references calcium phosphate salt system and zeolite system (i.e., 1.2 or 2.6 μm).

Applicants also argue on page 7 that Koji et al. do not describe the relation of the particle size between the tetravalent metal phosphate-based particles and the inorganic compound particles. However, Wells et al. teach that titanium dioxide is a particularly

preferred additive in spinning highly viscous synthetic polymer fibers used to decrease the luster of the resulting fiber spun from the molten polymer, wherein the preferred average diameter is 0.1 to 0.5 μm, most preferably 0.2 μm or less. Therefore, one of ordinary skill in the art would have been motivated to use titanium dioxide with an average diameter of approximately 0.2 μm, which would be smaller than the particles size of the tetravalent metal phosphate-based particles.

2. Claims 1, 4-6, 9-11 and 14-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hideki et al. (JP 10-265314) in view of Wells et al. (US 4,356,280).

Applicant claims:

Applicants claim an antimicrobial composition comprising tetravalent metal phosphate-based antimicrobial particles represented by Formula (1) and inorganic compound particles, wherein both particle sizes are 0.1 to 5 μm, the inorganic compound particles are smaller than the tetravalent metal phosphate-based antimicrobial particles, and the inorganic compound particles are anatase titanium dioxide.

Determination of the scope and content of the prior art

(MPEP 2141.01)

Hideki et al. teach an antimicrobial agent composition obtained by including an antimicrobial powder represented by the formula $M1_aA_bM2_c(PO_4)_d \cdot nH_2O$ and a fluidity improving powder, such as alkaline earth metal salt powder, an amino acid-based modifier or an alkaline earth metallic salt of a higher fatty acid; wherein M1 is at least

one ion selected from silver, zinc tin, mercury, lead, iron, cobalt, nickel, manganese, arsenic, antimony, bismuth, barium, cadmium and chromium with the valence of (l), A is at least one ion selected from an alkali metal, an alkaline metal, ammonium or hydrogen with a valence of (m), M2 is a tetravalent metal, $0 \le n \ge 6$, (a) and (b) are each a positive number, (c) is 2 and (d) is 3 when (la)+(mb)=1 (Abstract), and is suitable for use in a fiber ([0001]). Hideki et al. further teach that M1 is preferably silver because mildew-proofing, antibacterial properties, and seaweed-proofing nature can also be raised while it is excellent in safety ([0007]); A is preferably lithium ion, sodium ion, a hydrogen ion or ammonium ion ([0008]); and M2 is preferably zirconium and titanium ([0008]). Hideki et al. teach several examples of the following formulas ([0009])

$Ag_{0.005}Li_{0.995}Zr_2(PO_4)_3$
$Ag_{0.01}(NH_4)_{0.99}Zr_2(PO_4)_3$
$Ag_{0.05}Na_{0.95}Zr_2(PO_4)_3$
$Ag_{0.2}K_{0.8}Ti_2(PO_4)_3$
$Ag_{0.005}Li_{0.505}H_{0.49}Zr_2(PO_4)_3 \bullet 1.1\ H_2O$
$Ag_{0.01}(NH_4)_{0.59}H_{0.4}Zr_2(PO_4)_3 \bullet 1.2\ H_2O$
$Ag_{0.05}H_{0.95}Zr_2(PO_4)_3 \bullet 1.5\ H_2O$
$Ag_{0.05}Na_{0.5}H_{0.45}Zr_2(PO_4)_3 \bullet 1.1\ H_2O$
$Ag_{0.05}Na_{0.6}K_{0.11}H_{0.24}Zr_2(PO_4)_3 \bullet 1.2\ H_2O$
$Ag_{0.05}Ca_{0.1}H_{0.75}Zr_2(PO_4)_3 \bullet 1.2\ H_2O$
$Ag_{0.1}Na_{0.5}H_{0.4}Zr_2(PO_4)_3 \bullet 1.1\ H_2O$
$Ag_{0.2}Na_{0.3}H_{0.5}Zr_2(PO_4)_3$
$Ag_{0.005}Li_{0.505}H_{0.49}Zr_2(PO_4)_3 \bullet 1.1\ H_2O$
$Ag_{0.01}(NH_4)_{0.59}H_{0.4}Zr_2(PO_4)_3 \bullet 1.2\ H_2O$

Hideki et al. also teach that the fluidity improving powder includes calcium carbonate, magnesium carbonate, magnesium stearate, magnesium oleate, oleic acid

calcium, alumina, aluminum hydroxide, potassium aluminum sulfate, MgO, calcium phosphate, talc, titanium oxide, colloidal silica, aluminum silicate hydrate, etc. ([0012]). Also, Hideki et al. teach that the fluidity improving powder is present at 5 to 200 wt. parts to 100 wt. parts of antibacterial powder ([0012]). Furthermore, Hideki et al. teach an example wherein the antimicrobial powder has a mean particle diameter of 0.9 μm or 1.3 μm, and the fluidity improving powder, calcium-carbonate powder, has a mean particle diameter of 9.7 μm ([0017] and [0018]).

Ascertainment of the difference between the prior art and the claims

(MPEP 2141.02)

Hideki et al. do not teach that the titanium dioxide is anatase titanium dioxide and that the mean particle size of the titanium dioxide is less than the mean particle size of the antimicrobial powder. However, Wells et al. teach that titanium dioxide is a particularly preferred additive in spinning highly viscous synthetic polymer fibers used to decrease the luster of the resulting fiber spun from the molten polymer (col. 1, ll. 12-31). Wells et al. further teach that anatase titanium dioxide is the preferred form because it is softer than rutile, thereby giving lower abrasiveness in yarn processing equipment, and the preferred average diameter is 0.1 to 0.5 μm, most preferably 0.2 μm or less (col. 3, ll. 1-16).

Finding of *prima facie* obviousness

Rational and Motivation (MPEP 2142-43)

Therefore, it would have been *prima facie* obvious for one skilled in the art at the time of the invention to prepare an antimicrobial agent composition obtained by

including an antimicrobial powder with a mean particle diameter of 0.9 μm or 1.3 μm represented by the formula $M1_aA_bM2_c(PO_4)_d \cdot nH_2O$ and a fluidity improving powder, such as titanium dioxide, as reasonably taught by Hideki et al., and use anatase titanium dioxide with an average particle size of 0.1 to 0.5 μm, most preferably 0.2 μm or less, as reasonably taught by Wells et al. One of ordinary skill in the art would have been motivated to use anatase titanium dioxide with a particle size of 0.1 to 0.5 μm, most preferably 0.2 μm or less, because Wells et al. teach that anatase titanium dioxide with a particle size of 0.1 to 0.5 μm, most preferably 0.2 μm or less is preferably used in the production of fibers because it is softer than rutile, thereby giving lower abrasiveness in yarn processing equipment.

From the teachings of the references, it is apparent that one of ordinary skill in the art would have had a reasonable expectation of success in producing the claimed invention. Therefore, the invention as a whole would have been prima facie obvious to one of ordinary skill in the art at the time the invention was made, as evidenced by the references, especially in the absence of evidence to the contrary.

Response to Arguments

Applicants argue on page 8 that Hideki et al. do not specifically teach the maximum particle size of the tetravalent metal phosphate-based particles and the maximum particle size of the inorganic compounds. However, the examiner respectfully argues that Hideki et al. teach an example wherein the antimicrobial powder has a mean particle diameter of 0.9 μm or 1.3 μm, and the calcium-carbonate powder has a mean particle diameter of 9.7 μm ([0017] and [0018]).

Applicants further argue on page 8 that the inorganic compound particles are not within 0.1-5 μm, as instantly claimed. Applicants also argue that the inorganic particle size is larger than the tetravalent metal phosphate-based compound particle size. However, the examiner respectfully argues that Wells et al. teach that titanium dioxide is a particularly preferred additive in spinning highly viscous synthetic polymer fibers used to decrease the luster of the resulting fiber spun from the molten polymer, wherein the preferred average diameter is 0.1 to 0.5 μm, most preferably 0.2 μm or less. Therefore, one of ordinary skill in the art would have been motivated to use titanium dioxide with an average diameter of approximately 0.2 μm, which would be smaller than the particles size of the tetravalent metal phosphate-based particles.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan W. Schlientz whose telephone number is (571)272-9924. The examiner can normally be reached on 9:00 AM to 5:30 PM, Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Johann R. Richter can be reached on 571-272-0646. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

NWS

/John Pak/
Primary Examiner, Art Unit 1616